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ABSTRACTS OF WATER WORKS LITERATURE

FRANK HANNAN

Key: American Journal of Public Health, 12: 1, 16, January, 1922. The figure 12 refers to the volume, 1 to the number of the issue, and 16 to the page of the Journal.

Tentative Plans for the Construction of a 780-ft. Rock-Fill Dam, on the Colorado River at Lee Ferry, Arizona. E. C. LARUE. Proc. A. S. C. E., 48: 4, 835, April, 1922. More than 4,000,000 continuous horse-power may be developed between Green River and Boulder Canyon. The aggregate installed capacity of the power plants would probably be more than 5,000,000 h. p. Lee Ferry Project. By building a dam at Lee Ferry to raise the water 700 ft., 1,000,000 h. p. may be developed at this site. The construction of high rock-fill dams by blasting down the towering canyon walls has been suggested in connection with the studies of both power and irrigation development. The raw materials necessary for the construction of rock-fill dam at this site are conveniently situated. The writer believes that a rock-fill dam properly constructed would be fully as safe as a concrete dam. The 20,000,000 acre-ft. of storage capacity of the upper 100 ft. of the Lee Ferry Reservoir may be sufficient to equalize the flow through the canyons of the lower river. With a 100 ft. drawdown, the average head available at Lee Ferry for power would be about 650 ft., and with the flow of the river equalized at this point, power plants in the canyon below could be operated under heads almost equal to the full height of the respective dams. The dam farthest down stream, however, should provide sufficient storage capacity to regulate the flow to conform to the demand for irrigation. Should this project be developed, water would be available for irrigation on the lower river for at least a generation to come, and the menace from floods would be removed (except floods from the Gila River).—*E. E. Bankson.*

Floods on Small Streams Caused by Rainfall of the Cloud-Burst Type. GERARD H. MATTHES. Proc. A. S. C. E., 48:5, 1096, May, 1922. In about 150 years of records for Baltimore, Md., 9 floods of this type occurred at intervals averaging 17 years. With the Erie record the floods were separated by 15 and 22 year intervals. Smaller flood records at Denver, Colo., average 18 years apart, and at York, Pa., 9 floods have been recorded at intervals averaging 18 years. In the design of spillways it has been considered proper to build for the largest flood, and often an additional factor of safety may be introduced. As more data on cloudburst floods become available, the tendency is to build larger and larger spillways. The retarding-basin system, however, offers special advantages for handling this class of floods, as the total flood run-off is not large and does not require basins of great size.—*E. E. Bankson.*

Buffalo Water Consumption Falling, but Still High. GEORGE C. ANDREWS. Eng. News-Record, 88: 950, 1922. Due to campaign against excessive water waste, the daily per capita consumption has fallen from 339 for 1916-7 to 227 gal. for 1921-2. The pumpage for the same period declined from av. of 168 to 117 m. g. d.—*Frank Bachmann (Courtesy Chem. Abst.)*.

Water Company Sued for Typhoid Damages.—ANON. Eng. News-Record 88: 951, 1922. Suits for damages totaling \$300,000 have been brought against the Blue Ridge Water Supply Co., Walnutport, Pa., by 30 residents who allege that the supplying of polluted water caused typhoid, sickness and death. Of 53 cases, 80 per cent had onset from June 13 to 21, 1921. State engineer attributes cause to contaminated spring used as auxiliary supply.—*Frank Bachmann. (Courtesy Chem. Abst.)*.

Ohio Cities Cannot Divert Water Revenues. ANON. Eng. News-Record, 88: 1028, 1922. The Ohio Supreme Court upheld the decision of the Lower Court which limited earnings of municipally owned waterworks to operation, maintenance, extensions and debt charges. Cincinnati desired to transfer \$500,000 of waterworks, revenue to relieve general taxation.—*Frank Bachmann (Courtesy Chem. Abst.)*.

Perforated Pipe Underdrains for Alpena Water Filters. WILLIAM G. CLARK. Eng. News-Record, 88: 1048, 1922. The 4 filters of the new 3 m.g.d. water purification plant for Alpena, Mich., will be provided with the perforated pipe type of underdrains.—*Frank Bachmann (Courtesy Chem. Abst.)*.

Public Health and Sanitary Engineering Work at Harvard Revised. ANON. Eng. News-Record, 89: 76, 1922. The Harvard School of Public Health will take the place of the school conducted jointly by Harvard Univ. and M. I. T. *Frank Bachmann (Courtesy Chem. Abst.)*.

Twenty Years' Filtration Practice at Albany, N. Y. G. E. WILLCOCK. Eng. News-Record 88: 879, 1922. Four distinct steps in method of treatment of water have been introduced:—(1) Slow sand filtration from 1899 to 1908; (2) double filtration commencing with 1908; (3) introduction of Cl in 1909; and, (4) coagulation followed by the by-passing of the preliminary filter effluent around the slow sand units. These steps show that a gradual change from slow sand to rapid sand filtration has taken place.—*Frank Bachmann (Courtesy Chem. Abst.)*.

Efficiency of Coke Aerating Towers (Riesslers) in Iron Removal. DR. KARL KISZKALT. Gas- und Wasserfach, 65: 37, 1922. Experiments on a riessler to which gelatine had been added as a protective colloid, to prevent the coagulation of colloidal iron. The amount of uncoagulated iron leaving the riessler was not dependent on the amount of iron entering with the raw water, but rather on the amount of iron removed by the tower. This throws the burden of the iron removal on the filters which follow the riessler, if the tower fails to remove the dissolved iron and at the same time to coagulate the iron in suspension.—*Jack J. Hinman, Jr., (F.M.) (Courtesy Chem. Abst.)*.

The Action of Open and Closed Filters in Iron Removal. KARL KISZKALT. Gas- und Wasserfach, 65: 85-86, 1922. To determine whether open or closed filters were best after passing water through coke aerating tower (riessler). An open slow sand filter with an area of 1 sq. meter; a closed filter with a surface area of 6 sq. meters and capacity of 50 cu. meters; an aerating tower of 33 sq. meter surface area and a capacity of 100 cu. meters per hour were used. The raw water contained 2 to 4 p. p. m. iron. Slow sand filter did not remove all iron from 1 cu. meter after aerating. Closed filter removed all iron from 50 cu. meters of the water after aeration.—*Jack J. Hinman, Jr., (M.F.) (Courtesy Chem. Abst.).*

Modern Methods of Preserving the Purity of Water Supplies. GEORGE R. TAYLOR. Penna. W. W. Assn. Report, 1921, page 28. The first line of defense in preserving purity is the collecting area. With small watersheds it is possible to buy the watershed. On the populated watershed strict sanitary control should be maintained as to household wastes, the house privy, etc. For the remedy on farms and for small groups of houses the work should be done by the utility combined with tactful handling. The expense for trade wastes and sewage should be borne by those producing them. However, if you want anything done, do it yourself. The second line of defense is the impounding reservoir giving sedimentation and germicidal effect of sunlight. Final surety of the water supply can only be secured through filtration or sterilization or both. The ideal is the eventual filtration of all surface supplies and the writer believes that chlorination should be adopted at once for every surface supply in the State.—*E. E. Bankson.*

Wood Pipe for Water Supply Mains. E. R. HANNUM. Penna. W. W. Assn. Report, 1921, page 47. In 1907 the Windber Water and Power Company constructed a wood pipe gravity water supply line eight miles in length and 24 inches to 16 inches diameter. The first 5 miles from reservoir fairly satisfactory under 43 pounds pressure. The next 2 miles, to 47 pounds pressure, is unsatisfactory as originally built. The remaining mile of 20-inch wood under 44 to 108 pounds pressure leaked from the start and after seven years the staves began to burst where knots run transversely of stave. In 1916 we replaced this last mile, again with wood. After two years trouble began and after four years the same transverse knot trouble started. We have laid a 10-inch cast iron line paralleling this last mile for use when repairing wood pipe. Our experience condemns wood stave pipe, mortise and tenon type, subject to pressure of 50 pounds or more and at 25 pounds, leaky joints are likely to develop.—*E. E. Bankson.*

Some Observations Concerning Water Works Supply Mains. J. W. LEDOUX. Penna. W. W. Assn. Report, 1921, page 42. For a conduit or supply main practically all types are used depending on the circumstances, cast iron, wrought iron, steel, reinforced concrete, wood or terra cotta. There are several vital precautions that should be taken when adopting wood pipe. Of installations of wooden pipe, probably at least 25 per cent have given good satisfaction. In

this respect, cast iron pipe is of great advantage in being "fool-proof." Reinforced concrete is coming more into use for supply mains.—*E. E. Bankson.*

Forestry for Water Companies. W. B. McCaleb. Penna. W. W. Assn. Report, 1921, page 86. Owners of timber lands have been greatly discouraged by the frequency and destructiveness of forest fires. The protection by the State is now well organized and will prove its value the first dangerous fire season. The Department advises that they have available for free distribution in 1922 four million forest tree seedlings and transplants. The kind of trees to plant will be printed in the Proceedings. Under favorable conditions one thousand feet board measure per acre per annum may be secured for a period of fifty years. Many water companies in the New England district have been successful in obtaining a satisfactory return. Therefore, the practice of forestry offers to water companies the possibility of profit.—*E. E. Bankson.*

Decisions of the Courts and Public Service Commissions during the Year, Affecting Water Companies. C. LARUE MUNSON AND EDGAR MUNSON. Penna. W. W. Assn. Report, 1921, page 102. (1) If water companies obey the law with regard to service and rates, there cannot be any municipal competition. (2) No act can be passed by the Legislature conflicting with the Act of 1874 regarding the price for the purchase of a waterworks by a municipality. (3) When your rates are filed to take effect they are all payable after the effective date of the new rate, notwithstanding any contest. (4) The Supreme Court of the United States made the important ruling in the Ohio Valley Case that every utility is entitled to the opinion of a Court (upon its own independent judgment), as to the facts controlling its valuation and rates, and that the Commission is not a Court. The result of that decision was that there are now two bodies to pass upon these questions of valuations,—the Commission and the Superior Court,—and the Supreme Court of Pennsylvania has added that they must be permitted to examine into the facts sufficiently to find that the evidence justifies the findings. (5) The Supreme Court of Pennsylvania says that the Commission has no control over "Rentals paid underlying companies." No contract made by a utility is subject to a direct attack and revision, unless it is itself a rate contract. . . . If the statute gives to the Commission the power to reduce these rentals it may also increase them. . . . The law gives neither right. (6) But now comes a statute of the Pennsylvania Legislature, which allows a borough or a city to appoint a Commission to so regulate the mining of coal within the limits of that borough or city or township of the first class, as to prevent the digging out of that coal, if thereby the surface will subside. Water companies are interested in the result of that case. (7) The Supreme Court of the United States has spoken, in no uncertain terms, that the stockholders of a utility are entitled to the present value of property. Is it the five or ten year average of prices or is it present value?—*E. E. Bankson.*

Review of Cases. Ohio Valley Water Company Case, Superior Court. The item of going value held properly allowable is \$185,000 and \$92,415 should be added for brokerage. Beaver Valley Water Company Case. Preliminary costs

of promotion, construction and brokerage, \$100,000. "Going concern" value at least \$175,000. **Amortization of Rate Case Expenses.** Should not be "loaded on one year," but amortized over a period of three or more years. **Discrimination.** The service of the utility cannot be misapplied, and the cost imposed upon other shoulders. Rates should be uniformly applied. Any service rendered at other rates results in discrimination. When service is rendered to all consumers in the same class at the same rates, no unjust discrimination exists. Rates established by legally filed tariffs are the *only* legal rates. **Municipal Contracts.** Rate contracts with municipalities, individuals, or private corporation, are subject to rate-making power vested in the Commission, and where the common weal demands, the contract shall be modified. **Mercersburg, Lehmaster & Marks Electric Co. Case, Superior Court.** It seems to us to be plain that too much consideration of the element of original cost is just as likely to mislead an administrative tribunal as a jury. The Commission must have rested its finding largely, if not entirely, upon an undue consideration of original cost. **Mountain City Water Co. Case.** The Commission held that the ten-year average should be adopted. (Other Items of interest in all decisions for the year are touched upon, with index of Subjects and Cases.)—*E. E. Bankson.*

The Propriety of the Service Charge for Water Service. *GEORGE W. BIGGS, JR. Penna. W. W. Assn., 1921 Report*, page 193. In only one or two instances out of twenty cases for our Company have the new rates been made upon scientific lines. An earnest effort should be made to establish rates on a scientific basis and eliminate the present discriminatory features. It is generally conceded that the meter minimum is discriminatory. The service charge, on the other hand, eliminates this discriminatory feature. In the writer's opinion, the service charge should include all elements of cost of operation of keeping the entire plant filled with water, under pressure, ready to serve but not actually serving. The Pennsylvania Commission said: "Readiness-to-serve" includes those items of expense of keeping the gas or water in the pipes ready to be used. A recent paper before the American Water Works Association pointed out that the "maximum service charge" makes the service charge so high and the rate for water so low that it approaches a flat rate basis of charge and nullifies the benefits of metering.—*E. E. Bankson.*

The Hot Springs in North Island, New Zealand (Note). *Water & Water Eng. (London)*, 24: 225, June 20, 1922. The sulphuric acid waters of the Rotorua Springs in North Id. are used as baths and have a natural heat of from 85 to 105°F. These acid baths have proved of great value in all "rheumatic" conditions, in rheumatoid arthritis and in anemia. In the neighborhood are several other spas whose waters possess alkaline, sulphur, and other properties.—*Geo. C. Bunker.*

Measuring 365 Million Gallons per Day (Notes). *Water & Water Eng. (London)*, 24: 225, June, 1922. An order has just been issued by the Metropolitan Water Board for 3 Kent Venturi meters, each 108 in. in diameter, for the new Littleton reservoir. These meters, when installed, will be the largest

in use in the United Kingdom, and the second largest manufactured in England, the largest being 120 in. in diameter for the Divi Irrigation Works, Madras, about 15 years ago. The recorders to work in conjunction with these tubes are of the water column type, the tubes being placed on the gravitation mains from the reservoir.—*Geo. C. Bunker.*

Hydrogen-ion Concentration in Natural Water. J. T. SAUNDERS. Proc. Cambridge Philosophical Soc., no. 20, 350, 1921. Abstract, Water & Water Eng. (London), 24: 227, June 20, 1922. The concentration in waters taken from streams, lakes, and wells in chalky soil or subsoil is fairly constant, the well and ground water ranging between pH 7.1 and 7.2; that from streams between pH 8.25 and 8.5. In large and deep ponds and lakes the concentration remains fairly constant between pH 8.25 and 8.5, but drops in smaller bodies.—*Geo. C. Bunker.*

Chester Waterworks: Past and Present. FREDERICK STORR AND C. WILFRID BENNETT. Water & Water Eng. (London), 24: 193, June 20, 1922. There are well supported proofs that the Romans, when they had established their rule in Britain, installed a water works. Pieces of pipe, made of lead and about 4 inches in diameter, were recently found in one of the streets and on one length there was the following inscription dated A. D. 79; "that this pipe was made when Julius Agricola was Governor of Britain." The water supply is taken from the River Dee (Riverside Works) and pumped to the Tower Works where the original slow sand and the roughing or rapid sand gravity filters are located. The available filter area of the slow sand filters is 74,850 sq. ft. The typical section is as follows: perforated bricks on filter bottom, 4½-in.; pebbles passing ¼-in., 4-in.; fine pebbles passing ¼-in., 2-in.; coarse pit sand, 60 per cent retained on 40 per inch mesh, 1 ft. 3 in.; fine pit sand, 65 per cent retained on 70 per inch mesh; 1 ft.; coarse pit sand, 60 per cent retained on 40 per inch mesh, 1 ft. 3 in. total depth, 4 ft. 4½-in. This form of filter has been in use for many years, and yields exceptionally good results. The interposition of the layer of fine sand has been the subject of much criticism, but it has stood the test of time, and there is no doubt the remarkable results obtained are in a great measure due to its action. Due to the heavy load thrown on these filters due to the varying conditions of the river, 6 reinforced concrete rapid sand filters, each 24 by 12 ft. in plan by 8 ft. deep, were added to serve as roughing filters. The filtering material consists of 4 ft. of Leighton Buzzard sand over graded pebbles. The maximum rate of filtration is 86.8 gal. per sq. ft. per hour. No coagulant is used. An air wash is used in connection with a water wash. The cleanings vary with the state of the river from a maximum of 11 cleanings in one day to a single cleaning in 5 days. Before these filters were installed the slow sand filters required cleaning in the winter months every 7 to 12 days; after they were installed some of the slow sand filters have run for 5 months between cleanings. Attention is called to the fact that the same very moderate water rate, fixed some 65 years ago, is still in use.—*Geo. C. Bunker.*

The Recovery of Oil and Grease from Technical and Industrial Sewage. BRUNO SIMMERSBACH. Chem. Ztg., 45: 887-90, 1921. From Chem. Abst. 16:

306, January 20, 1922. Various methods for the recovery of grease from sewage are described, including drying the sludge and extracting grease with benzene or trichloroethane; centrifuging yielding a by-product which can be used as fuel; and oil traps which extract oil and grease of the water alone. The O.M.S. system is used successfully in the treatment of industrial wastes. The water is freed from suspended matter and the oil and grease collected from the surface and purified.—*R. E. Thompson.*

Free Alkalinity in Glass Containers. A. W. BITTING. Glass Ind., 2: 235-7, 1921. From Chem. Abst., 16: 322-3, January 20, 1922. Results of experiments indicate that American bottles, including flint, blue, green, and amber glasses, have a free alkalinity which is practically negligible except for particularly accurate work. The containers were filled to capacity with dilute sulphuric acid and also with distilled water and allowed to stand from 1 to 48 hours. The average results, expressed in milligrams of sodium hydroxide per liter, ranged from 0.40 for a 250-cc. bottle to 26.64 and 33.92 milligrams for a 5 cc. container. The results were approximately doubled on standing two weeks, but increased very slowly with longer standing.—*R. E. Thompson.*

Some Examples of Corrosion of Reinforcing Steel. F. P. McKIBBEN. Eng. News-Record, 87: 531-32, 1921. From Chem. Abst., 16: 325, January 20, 1922. Fourteen structures inspected showed corrosion of reinforcing steel due to chemical action, generally caused by the presence of salt. The steel rods rusted, thereby increasing in diameter and resulting in cracks in the concrete parallel to the rods. These fourteen structures are contrasted with many thousands of others which are rendering good service.—*R. E. Thompson.*

Hard Water in Silk Hosiery Dyeing. H. L. TIGER. Textile World, 60: 2299-2303, 2314, 1921. From Chem. Abst., 16: 345, January 20, 1922. Water containing 5.5 grains of hardness is disadvantageous in the boiling off and dyeing of silk.—*R. E. Thompson.*

Rusting Caused by Carbonic Acid. G. BRUHNS. Chem.-Ztg. 45: 885-7, 1921. From Chem. Abst., 16: 230, January 20, 1922. Carbon dioxide in boiler feed water, occurring in the free state or formed as a result of the decomposition of bicarbonates, will cause rusting. The ferrous carbonate formed is immediately hydrolyzed to iron hydroxide and the carbon dioxide thus liberated causes the rusting process to be repeated. If nitrates are present, nitric acid is formed and the corrosion is greater. Careful treatment of the feed water provides ample protection against rusting.—*R. E. Thompson.*

The Determination of Bromine in Saline Waters. LEBEAU AND PICON. Bull. soc. Chem., 29: 739-43, 1921. From Chem. Abst., 16: 217-8, January 20, 1922. The following modification is suggested for Figuier's volumetric method for the determination of bromine, which was found to give inaccurate results due to the presence of halogen acids. The bromine is liberated with chlorine water and extracted with chloroform. The chloroform extract is then treated

with potassium iodide and the liberated iodine titrated with standard sodium thiosulphate. This method gives result with an accuracy of 1 per cent.—*R. E. Thompson.*

Measurement of Hydrogen-ion Concentration. G. W. MONIER-WILLIAMS. Analyst, 46: 315-24, 1921. From Chem. Abst., 16: 219. January 20, 1922. A brief description of, and notes on, the electrometric method of determining H-ion concentration.—*R. E. Thompson.*

A B. Coli-Inhibiting Medium for Paratyphoid. B. K. PESCH. Centr. Bakt. Parasitenk., Abt. 1, 86: 97-101, 1921. From Chem. Abst., 16: 271, January 20, 1922. An agar medium containing 0.19 per cent ammonium sulphate as the source of nitrogen and 1 per cent sodium citrate as the source of carbon will inhibit the growth of *B. coli*, *B. typhosus* and *B. paratyphosus A*. When the sodium citrate was replaced by 1 per cent potassium tartrate, *B. coli* and *B. paratyphosus B* grew while *B. paratyphosus A* and *B. typhosus* were inhibited.—*R. E. Thompson.*

The Ionization Constants of Glycerophosphates and Their Use as Buffers, Especially in Culture Mediums. R. R. MELLONS, S. F. ACREE, P. M. AVERY AND E. A. SLAGLE. J. Infect. Dis., 29: 1-6, 1921. From Chem. Abst., 16: 271, January 20, 1922. The fact that the ionization constants of glycerophosphates are substantially the same as those of the nonglycerolated phosphates makes possible the substitution of these salts as buffers in culture media. The greater stability of these salts in the lower alkaline ranges prevents much of the objectionable precipitation of phosphates in media after autoclaving.—*R. E. Thompson.*

The Cement Gun in Water Works Construction. H. A. HAMMICK. The Surveyor, 61: 191, February 24, 1922. Some of the difficulties experienced in plastering a water reservoir by means of a cement gun are described. It was found that the nozzle of the gun should be approximately normal to the surface at a distance of two feet, and kept gently in motion. It is estimated that the cost of applying $\frac{1}{2}$ inch of Gunite to a large flat surface would be approximately equal to the cost of $\frac{1}{4}$ inch of hand-placed plaster, and would be a much better protection.—*R. E. Thompson.*

Investigation by Means of the Hydrogen Electrode of the Chemical Reactions Involved in Water Purification. R. E. GREENFIELD with A. M. BUSWELL. Jour. American Chemical Soc., 44: 1435-42, 1922. The hydrogen electrode is used to follow the course of reactions occurring in water softening and purification. Reactions studied were titration of CaCO_3 and MgCO_3 , precipitation of CaCO_3 , Mg(OH)_2 and Al(OH)_3 . Data show: 1. Phenolphthalein and methyl orange are suitable indicators for titration of carbonate solutions; 2. Precipitation of magnesium as hydroxide did not start until the pH value reached 9.0, and was complete at pH 10.6; that precipitation of Ca as carbonate was complete at pH 9.5; and that Al(OH)_3 started precipitation in solution as acid as pH 4 and to be completely precipitated at pH 6.5 to 7.5. At higher values, reso-

lution started and was complete at a value between pH 10 and 11. Further studies are being made on precipitation of $Mg(OH)_2$ and $Al(OH)_3$.—*Charles P. Hoover.*

Report of Committee on Water-Works and Water Supply. NICHOLAS S. HILL, Chairman. Proc. American Society of Municipal Improvements, 1921 Convention: 60-73. A résumé of the status of water supply practice in 1921 is given. The committee calls attention to the desirability of keeping the operating force at the highest standard possible by paying adequate salaries, and to the need of establishing more equitable water rates. Other subjects, such as uniform accounting, standardization of materials, pumping machinery, rainfall and run-off records, distribution systems, standards for water quality, water softening, water supply and diseases, water purification and electrolysis, are briefly discussed.—*John R. Baylis.*

Maintenance and Restoration of the Purity of the Water Supply of Baltimore. JAS. W. ARMSTRONG. Proc. American Society of Municipal Improvements, 1921 Convention: 90-100. Preventing contamination of the Baltimore water supply has been partly accomplished by purchasing land and systematic inspections of all premises on the watershed. Moral suasion and good natured persistence have been the means of getting rid of the worst sources of pollution. Over one million trees, mostly white pine and spruce, have been planted on land owned by the City. Additional reforestation is recommended. Work was started in March, 1921, on raising the level of the Loch Raven dam to form a storage reservoir of about 23 billion gallons capacity. A new tunnel from the reservoir to Montebello Filters is recommended, but at present a balancing reservoir will be constructed to prevent excessive pressure on the present tunnel. The method of treatment at the Montebello Filters is briefly outlined.—*John R. Baylis.*

Water Supply of Baltimore. V. BERNARD SIEMS. Proc. American Society of Municipal Improvements, 1921 Convention: 74-89. A brief history of the water supply of Baltimore from the first attempt to establish a supply in 1787 to the present time. Mr. Siems outlines the need of additional pumping stations and extension of the distribution system. The pitometer survey now in progress has covered approximately 10 per cent of the area, has cost \$20,000 and has effected a saving of about 6 million gallons daily. In 1920 eighteen inspectresses located 28,227 leaks of which 1,633 were turned off because of non-compliance with notice to repair. Estimated saving from house inspection is 5 million gallons daily.—*John R. Baylis.*